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Massachusetts Health Care Cost Trends

Trends in Health Expenditures

Technical Appendix

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DIVISION OF
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Introduction

This appendix describes the methods used to develop the analysis of health care cost trends for private payers, Medicare, and Medicaid. The data sources, methods for cleaning and sorting the data, and development of measures and estimates are noted for private payers and each public payer.

A. Private Payer Analysis

1. Data Sources

a. Claims data

The private payer analysis tracked the service use and cost of Massachusetts residents with comprehensive private medical insurance obtained through an employer or directly on the nongroup market.[1] For fully-insured individuals, eligibility and claims data was obtained from the Health Care Quality and Cost Council (HCQCC). Additionally, the Division of Health Care Finance and Policy (DHCFP) requested that carriers submit directly all eligibility and claims data for any self-insured business based in Massachusetts. The analysis files were created using eligibility data for any member enrolled between January 1, 2007 and December 31, 2009 and using medical and pharmacy claims with an incurred date between January 1, 2007 and December 31, 2009.

The HCQCC data for 2007 through 2009 included enrollment and claims from 19 carriers. Four of the carriers were dropped from the analysis because they reported relatively minor enrollment of a few hundred lives per month in only one or two of the three study years.[2] Another four carriers were dropped because medical or pharmacy claims were missing entirely in 2007 or 2008, or because extremely low per member per month (pmpm) spending levels along with strange distribution of key variables suggested the majority of these carriers' enrollment was in plans that were not comprehensive medical products.[3]

From the remaining eleven carriers, DHCFP requested additional data on any self-insured business and supplemental information on capitation and payments not flowing through the claims system. Five of the eleven carriers separately submitted data for their self-insured business. During an extensive process of data validation and correction, six of the eleven major carriers were dropped from the analysis because of data problems that could not be corrected in a timely way.

[1] Individuals in the HCQCC data or the separately-reported self-insured data who had primary coverage through Medicare and secondary coverage through an employer were excluded, as were any non-Massachusetts residents, or enrollees in MassHealth or Commonwealth Care.

[2] The carriers reporting enrollment in only one or two years were Union Security Insurance Company, John Alden Life Insurance Company, First Health Life and Health Insurance Company, and Boston Medical Center HealthNet Plan.

[3] The carriers with missing medical or pharmacy claims in 2007 or 2008 were Consolidated Health Plans, Inc. and Guardian Life Insurance Company of America. The carriers with large suspected enrollment in non-comprehensive medical plans were MEGA Life and Health Insurance Company and Mid-West National Life Insurance Company of Tennessee.

The five carriers included in the final analysis file, Blue Cross Blue Shield of Massachusetts, ConnectiCare, Harvard Pilgrim Health Care, Health New England, and Tufts Health Plan represented the majority of the enrollment reported in the HCQCC and the separately-submitted self-insured files, with an average monthly enrollment across all five payers of 2.8 million in 2009.

b. Other payments for health care

Four of the five carriers analyzed separately reported two major categories of payments to providers that did not flow through their claims systems: capitation payments that correspond to encounter claims and other payments such as pay-for-performance withholds and bonuses that do not correspond directly to service use.

All five of the carriers used capitation to deliver at least some services to beneficiaries. In both the HCQCC data and the separately-reported self-insured data submission, carriers flagged capitated encounter claims and imputed a paid amount equal to the fee-for-service (FFS) equivalent that would have been paid had the service not been capitated. All four of the carriers that provided supplemental information on capitation payments recommended discarding most or all of the capitated encounter claims and using the supplemental capitation payment information instead. Since capitation payments could not be meaningfully allocated to individual services, these encounter claims were not included in the sub-analyses of payments by provider type (inpatient hospital, outpatient hospital, professional services, and imaging services) but were included in the estimates of overall spending. For the one carrier that did not submit supplemental information on capitation payments flowing outside the claims system, it was assumed that the FFS equivalents on the capitation encounter claims were a reasonable approximation of total capitation payments and included these claims in all sections.[4]

Other payments that did not flow through the claims system also are reported in the overview section. Like the capitation adjustment, these payments could not be assigned to specific services or beneficiaries and were not included in the more detailed estimates (by type of service or insurance market segment) in this report.

[4] Capitated encounter claims accounted for less than 2 percent of total claims lines for this carrier, so the error in using the FFS equivalents rather than the true capitation payments is relatively minor.

Fully Insured and Self-Insured Businesses

All carriers provided data separately for their fully insured and self-insured business.

The age distribution of enrollees and estimated spending per member year are reported in Tables A.1 and A.2. Estimates are provided for the population of all members as well as separately for self insured and fully-insured businesses.

Table A.1: Age Distribution of Privately Insured Enrollees by Fully Insured or Self-Insured Status, 2007-2009

	All members	Self-insured	Fully-insured
Number of member-years			
2007	2,907,384	1,180,379	1,727,005
2008	2,860,156	1,218,163	1,641,993
2009	2,761,938	1,241,127	1,520,812
Percent of members by age			
2007			
Under age 18	24.1%	24.2%	24.1%
Age 18 to 24	9.7%	9.7%	9.7%
Age 25 to 44	30.3%	29.0%	31.2%
Age 45 to 64	32.7%	33.6%	32.1%
Over age 65	2.9%	3.6%	2.3%
2008			
Under age 18	23.5%	23.8%	23.4%
Age 18 to 24	10.2%	10.0%	10.4%
Age 25 to 44	30.1%	28.8%	31.1%
Age 45 to 64	32.9%	33.7%	32.3%
Over age 65	3.0%	3.7%	2.5%
2009			
Under age 18	23.2%	23.4%	23.1%
Age 18 to 24	10.3%	10.0%	10.5%
Age 25 to 44	29.7%	28.4%	30.8%
Age 45 to 64	33.7%	34.5%	33.0%
Over age 65	3.1%	3.7%	2.6%

Source: Mathematica Policy Research analysis of private claims data for Massachusetts residents in insured and self-insured plans.

Table A.2: Total Spending and Spending per Member Year for Privately Insured Enrollees by Fully-Insured or Self-Insured Status, 2007-2009

	All members	Self-insured	Fully-insured
Total spending (in billions)			
2007	$11.6	$5.0	$6.6
2008	$12.1	$5.5	$6.6
2009	$13.1	$6.2	$6.9
Average annual growth			
2007-2009	6.3%	11.1%	2.4%
2007-2008	4.7%	10.8%	0.1%
2008-2009	7.8%	11.5%	4.7%
Percent of growth			
2007-2009	100.0%	78.7%	21.3%
2007-2008	100.0%	98.3%	1.7%
2008-2009	100.0%	67.2%	32.8%
Spending per member year			
2007	$3,979	$4,237	$3,803
2008	$4,237	$4,549	$4,006
2009	$4,730	$4,977	$4,529
Average annual growth			
2007-2009	9.0%	8.4%	9.1%
2007-2008	6.5%	7.4%	5.3%
2008-2009	11.6%	9.4%	13.0%

Source: Mathematica Policy Research analysis of private claims data for Massachusetts residents in insured and self-insured plans.

Carve-outs

Many of the carriers reported carved out administration of prescription drug or behavioral health benefits to third party administrators. Only Health New England did not submit claims administered through its behavioral health carve-out into the HCQCC data. However, all carriers noted that self-insured groups or large fully-insured groups might have declined prescription drug or behavioral health coverage from the carrier and independently contracted with third-party administrators for coverage. In these cases, claims were not submitted to the HCQCC nor included in the separately-submitted self-insured claims data.

To correct for these missing data, it was assumed that all self-insured groups with no prescription drug coverage had separately contracted with a pharmacy benefit manager (PBM), and their average pmpm prescription drug spending was imputed from the self-insured groups that had elected prescription drug coverage through the carrier. Missing behavioral health claims were not corrected, as there was no way to determine which employer groups contracted behavioral health benefits through the carrier and which ones declined the coverage. As a result, estimates of total and pmpm medical spending for behavioral health may be understated in each year.

2. Data Cleaning

Extensive data checks were performed to identify potential errors in reporting or missing data. These checks led to several carriers resubmitting enrollment or claims data files for one or more months, as well as programming adjustments to accommodate differences in how carriers populated data fields. In one case, data that had been submitted in the HCQCC data and also submitted in the separate self-insured data submission was de-duplicated. Due to the unexpectedly high percentage of claim lines with negative or zero values, each carrier was contacted to determine the correct method for identifying final claims and discarding interim or denied claims. After re-versioning both the HCQCC data and the self-insured data, each carrier was provided with key estimates for its fully-insured and self-insured business, and four of the five carriers confirmed that the estimates matched their own estimates.

To standardize claims across carriers by type of service, the billing entity type (person or non-person), provider ID, type of bill, location of service, and any revenue codes were referenced as shown in Figure A.1. First, professional claims were identified using the entity type variable. Facility claims with a provider ID that matched to a known Massachusetts general acute care hospital then were assigned to the inpatient, outpatient, or "all other" services category using the type of bill, location of service, and revenue code, as shown in Table A.3. Out-of-state claims for inpatient or outpatient hospital services were identified and classified using type of bill, location of service, and revenue code. Only acute care services provided at general hospitals were included in the inpatient and outpatient hospital categories; inpatient stays classified as intermediate care, nursing home, or swing beds were assigned to the "all other" services category even when provided at an acute care hospital.

Services provided at psychiatric hospitals or long-term care hospitals also were assigned to the "all other" category. Any Massachusetts facility claim that could not be assigned to inpatient or outpatient hospital was included in the "all other" file, and the provider names and specialty codes for these claims were checked to ensure no hospital or professional claims were mistakenly included.

All medical and pharmacy claims were included in the overview of expenditures and utilization, including those that could not be assigned to the standardized inpatient hospital, outpatient hospital, or professional services categories. Thus, the overview estimates include not only inpatient, outpatient, and professional services, but also prescription drugs and "all other" non-hospital services such as skilled nursing and other non-acute institutional care, outpatient services at freestanding facilities such as dialysis centers or ambulatory surgical centers, laboratory services, home health care, ambulance services, and durable medical equipment.

Figure A.1: Mapping HCQCC Data to Analysis Files

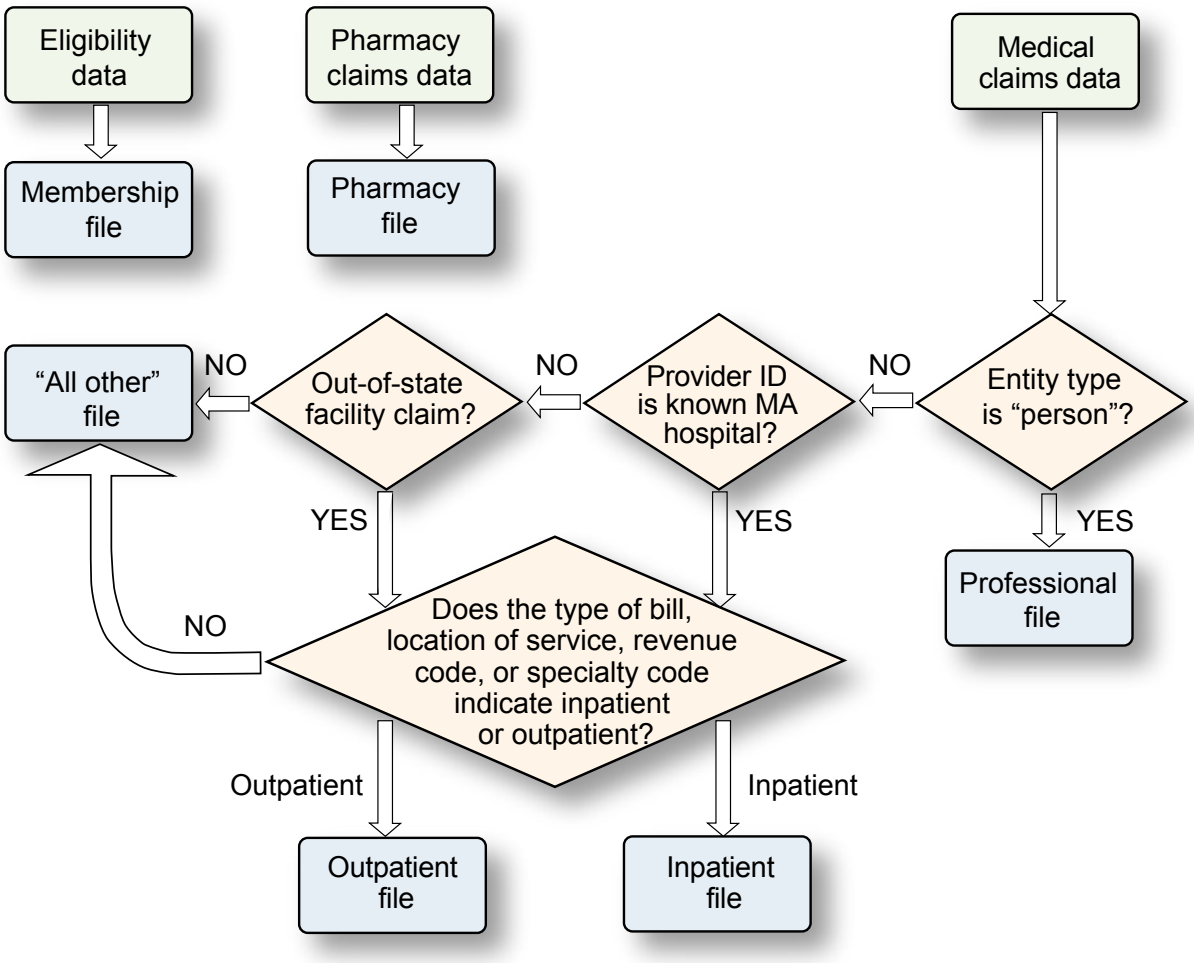

Table A.3: Mapping Hospital Claims to Inpatient and Outpatient Files

Provider	Type of Bill	Location of Service	Revenue Code	Analysis file assignment
Massachusetts hospital or out-of-state hospital	Inpatient hospital	Inpatient hospital	110-189 | 200-229 1000-1005 (MA hospitals only)	Inpatient hospital file
Massachusetts hospital	Outpatient hospital, clinic, ambulatory surgical center, or birthing center	Outpatient hospital, emergency room, ambulatory surgical center, birthing center, urgent care facility, independent clinic, and all other outpatient locations	450-459 | 490-529 905-907 | 912-913 944-945	Outpatient hospital file
Out-of-state hospital	Outpatient hospital	Outpatient hospital or emergency room	450-459 490-519	Outpatient hospital file

Note: "Massachusetts hospital" means a facility with a provider ID matching to a known general acute care hospital in the state, or to a VA hospital in the state. A match to any of the values specified in the Type of Bill, Location of Service, or Revenue Code was sufficient to assign a claim to the inpatient or outpatient file. If the assignment based on any of the three variables conflicted, Type of Bill was given precedence, followed by Location of Service and Revenue Code.

3. Measures of Spending and Utilization

a. Measuring expenditures

The expenditures captured in this report represent carrier payments to providers and member cost-sharing. Expenditures were measured as the sum of all FFS payment amounts on final claims, which reflect negotiated prices for each carrier and service provider less any third-party payments (not available in the HCQCC data), as well as direct payments from carriers to providers under capitation contracts plus any patient cost-sharing for capitated services. In the overview section, both FFS and capitation payments are included; in later sub-analyses by provider type (inpatient hospital, outpatient hospital, physicians and other professionals, and all other facility services) and by service type (imaging services), only FFS claims are included for most carriers.

b. Measuring utilization

The carriers provided claims data at the claim-line level. For all service types except inpatient hospitalizations and imaging services, service use was measured at the claim level, so that multiple lines on a single claim were counted as one service.

The unit of measurement for inpatient hospital care was a hospital admission. The line item detail for each hospital stay was rolled up to the admission, using a claim ID to sum across claim lines as necessary. In cases where the facility and physician submitted separate claims for the same outpatient visit or hospital admission, service use is counted in both the facilities sections and in the professional services section of this report.

Imaging services were measured at the claim-line level and counted only once, regardless of whether the service was billed globally or billed separately. In an inpatient setting, the technical component of imaging services is often bundled into the payment for the entire stay, while the professional component of interpretation and reporting is billed and paid separately. In an outpatient or office setting, imaging services may be billed globally (a single bill for both the technical and professional components) or may be billed separately. For all imaging services provided outside of an inpatient setting, utilization was measured by counting only global bills and technical component bills.

c. Expenditures and utilization incurred but not reported

The claims for services other than prescription drugs reflected a nontrivial level of expense that was incurred but not reported (IBNR) as of June 2010. Therefore, to understand expenditure levels and trends, it was necessary to estimate completion factors for each service type.

Using a proprietary actuarial model, Oliver Wyman (under subcontract to Mathematica) estimated expenditure completion factors by calendar year for 37 service types and subcategories as needed to support the estimates for privately insured spending. Oliver Wyman's actuarial model considers claims by incurred and paid month, and uses a conventional "chain ladder" analysis to estimate IBNR expenditures by incurred month.

Actuarial judgment was used to adjust the initial estimates for outlier payments to avoid skewing estimates of future claims. The monthly IBNR estimates were used to develop completion factors that were applied to each calendar year of reported claims to estimate the total incurred expenditures by calendar year for 37 service types and subcategories.

Finally, it was necessary to estimate analogous completion factors for measures of utilization (hospital admissions, inpatient days, outpatient claims, professional service claims, and imaging claims). It was assumed that 2007 claims were effectively complete (consistent with Oliver Wyman's modeling results) and completion factors were estimated for 2008 and 2009 claims data. Completion factors for 2008 were estimated as the percentage of services, admissions, or days incurred in 2007 that were reported by June 2009 (an 18-month run-out). Completion factors for 2009 were estimated as the percentage of claims incurred in 2007 that were reported by June 2008 (a 6-month run-out).

4. Analysis of Spending and Utilization

a. Inpatient hospital care

Spending and utilization (admissions) were tabulated for each carrier by year type of admission, and type and location of hospital. The All-Payer Refined Diagnosis Related Group (APR-DRG) version 24 was used to classify each stay as medical, surgical, maternity/newborn, or behavioral health.[5] Hospital types were assigned to differentiate hospitals as tertiary care hospitals, specialty and other teaching hospitals, and community hospitals. Hospitals that offered both cardiovascular surgery and neurosurgery were classified as tertiary care hospitals.[6] Hospitals that did not provide both services but which had teaching programs with 25 or more full-time residents were classified as specialty hospitals. Hospitals with smaller or no teaching program that did not provide cardiovascular surgery and neurosurgery were classified as community hospitals. Table A.4 compares this year's classification with the classification used in DHCFP's 2010 analysis of health care cost trends and lists the hospitals in the Boston Metro area.[7]

Table A.4: Tertiary Care, Specialty, and All Other Non-Teaching Hospitals

New Classification	Classification in DHCFP's 2010 Cost Trends report	Number of Hospitals	Hospital Names
Tertiary Care Hospital	Teaching Hospital	11	Baystate Medical Center Beth Israel Deaconess Medical Center Boston Medical Center Brigham & Women's Hospital Caritas St. Elizabeth's Medical Center Lahey Clinic Massachusetts General Hospital Mount Auburn Hospital Saint Vincent Hospital Tufts Medical Center U Mass Medical Center—University Campus
	Non-Teaching Hospital	4	Beth Israel Deaconess Hospital—Needham Cape Cod Hospital North Shore Medical Center/Salem Hospital Southcoast Health Systems—Charlton
Specialty or Other Teaching Hospital	Teaching Hospital	7	Children's Hospital Dana Farber Cancer Institute Mass Eye & Ear Infirmary U Mass Medical Center—Memorial Campus Cambridge Health Alliance—Cambridge Hospital Cambridge Health Alliance—Somerville Hospital Cambridge Health Alliance—Whidden Memorial Hospital
Community Hospital	Non-Teaching Hospital	53	All other hospitals

[5] Stays were classified into medical and surgical stays using the same typology as the APR-DRG grouper. The exceptions were maternity and newborn services, which includes all DRGs in Major Diagnostic Groups (MDC) 14 and 15, and behavioral health services, which includes all DRGs in MDCs 19 and 20.

[6] This definition is used by the Dartmouth Atlas of Healthcare in constructing Hospital Referral Regions (HRR). All but one of the 15 hospitals classified as tertiary care facilities also had an intermediate or intensive care neonatal unit (NICU).

[7] Massachusetts Division of Health Care Finance and Policy, *Massachusetts Health Care Cost Trends, Part III: Health Spending Trends for Privately Insured 2006-2008*, February 2010. Available at: http://www.mass.gov/Eeohhs2/docs/dhcfp/r/cost_trends_files/part3_exec_sum_health_spending_trends.pdf, accessed 5/22/2011.

"Boston Metro Area Hospitals" refers to hospitals located in the Boston Emergency Medical Services (EMS) region and include:

Brigham & Women's Hospital	Mass Eye and Ear Infirmary
Children's Hospital	Faulkner Hospital
Dana Farber Cancer Institute	Caritas Carney Hospital
Massachusetts General Hospital	Marlborough Hospital
South Shore Hospital	Metrowest Medical Center Leonard Morse
Beth Israel Deaconess Medical Center	New England Baptist Hospital
Caritas St. Elizabeth's Medical Center	Newton Wellesley Hospital
Mount Auburn Hospital	Quincy Medical Center
Beth Israel Deaconess Hospital Needham	Winchester Hospital
Boston Medical Center	Milton Hospital
Lahey Clinic	Caritas Norwood
Tufts Medical Center	Emerson Hospital
Cambridge Health Alliance – Cambridge	Metrowest Medical Center Framingham
Cambridge Health Alliance – Somerville	

b. Outpatient hospital services

Spending and utilization were tabulated for each carrier by year, insurance market segment, and hospital type and location. Hospitals were classified into types on the same basis as in the inpatient analysis.

c. Professional services

Spending and utilization were tabulated for each carrier by year, insurance market segment, provider type, and location of service. Physicians in general practice, family practice, internal medicine, obstetrics and gynecology, pediatrics, geriatric medicine, preventive medicine, public health and general preventive medicine, and adolescent medicine as indicated in the specialty type field were classified as primary care physicians, as were nurse practitioners. All other physicians were classified as specialists, and other non-physician professionals (e.g., nurses, dentists, chiropractors, therapists, and social workers) were classified as "other providers."

Professional services billed with a specialty type of "medical group practice," as well as professional bills with no specialty type, were classified as unknown provider type. The location of service was classified into office or clinic, inpatient hospital, outpatient hospital, psychiatric facility, or unknown location based on the site of service field on the claim.

d. Diagnostic Imaging

The cost of imaging services includes both a technical component charged by the facility or, in some cases, by the physician for use of radiological equipment and a professional component charged by the physician and other professionals for the interpretation of the image. In some cases, both components are billed together in a global bill, while other times the components are billed separately. The analyses of outpatient and professional services include, respectively, payments to facilities and payments to physicians for imaging services. The imaging services section combines both components and examines the cost and utilization of imaging services as a whole by type of imaging and location.

Type of imaging is based on the BETOS grouper, which classifies imaging services into X-ray and standard imaging, advanced imaging (including both CAT/CT/CTA and MRI/MRA), echography and ultrasound, and procedural imaging. This last category, which accounted for about 2 percent of all imaging, was dropped from this section. The location of imaging was divided into inpatient and all other locations, as the technical component of imaging services provided during an inpatient stay are not separable from the DRG payment for the stay and so only professional charges could be included.

5. Decomposition of Spending Change

Total expenditures were decomposed into amounts attributable to (1) changes in the average price per service, (2) changes in the number of services provided, and (3) changes in the mix of services delivered. For inpatient and outpatient hospital services, the amount attributable to changes in average price was further decomposed into (4) changes in the average price for hospitals by type and location and changes in price due to shifts in market share between hospitals.[8] Changes in medical expenditures were analyzed separately for inpatient hospital, outpatient hospital, physician and professional services, and imaging services.

a. Service market baskets

Decomposing total expenditures entailed defining a consistent market basket of services that could be compared from year to year. In turn, to develop a market basket of services required some parsing of the claims data.

[8] For inpatient and outpatient hospital services, average price is calculated for Boston-area tertiary or specialty hospitals, Boston-area community hospitals, non-Boston-area tertiary or specialty hospitals, or non-Boston-area community hospitals. Changes in the overall average price for a service are then attributable to increases in price for similar hospitals with similar labor costs–or "pure price change"–or to increases in average price due to a shift in market share towards hospitals in a higher-cost category.

First, claims with outlier values for the FFS amount were discarded,[9] as were all claims flagged as capitated, with missing or zero values for allowed amount, or with missing DRG, procedure, or revenue codes. To decompose price changes for inpatient and outpatient hospital spending, it was necessary to also exclude claims for admissions to out-of-state hospitals or to hospitals whose location or type was unknown. In order to ensure the measure of average price was meaningful from year to year, any procedure code or DRG with fewer than five claims in any year was also dropped.

Second, to eliminate distortion that differences in IBNR would introduce, claims paid more than a certain number of months after the end of the year in which they were incurred were excluded. Only claims paid within six months of the end of the year in which they were incurred were included in the decomposition: claims incurred in 2007 that were paid by June 2008, claims incurred in 2008 that were paid by June 2009, and claims incurred in 2009 that were paid by June 2010.

For each service type of interest (inpatient hospital, outpatient hospital, physician and professional services, and imaging services), a market basket of services in each category was defined as the services provided consistently in each comparison year. These services were then weighted by their utilization, averaged across all carriers and between comparison years.

b. Decomposition calculations

For professional and imaging services, the change in expenditures for market basket services from 2007 to 2008 and from 2008 to 2009 was decomposed into three components:

- *Additional expenditure due to changes in price*. This amount was calculated as the change in total expenditures for the market basket, holding the number and type of services received constant.
- *Additional expenditure due to a change in the number of services delivered*. This amount was calculated as the change in total expenditures for services in the market basket holding the price for each service and the mix of services constant, but allowing the quantity of each service (or admission type) to increase by the same percentage as the aggregate number of services (or admissions) increased during the year.
- *Additional expenditure due to a change in the service mix*. This amount was calculated as the change in total expenditures for services in the market basket holding the price for each service and the total number of services constant, but allowing the distribution of services to change to reflect actual usage patterns in the end year.

[9] The algorithm for identifying outlier values is as follows. For each carrier, start at the 90th percentile of the price distribution for each DRG or procedure code and search upward through each percentile until the upper bound is set or the maximum price is reached. The upper bound is set as 1.2 * P_i if the ratio of P_i to P_i+1 is greater than 1.5. Discard all claims with prices above the upper bound. A similar algorithm was used to identify outlier values at the bottom of the distribution.

For inpatient and outpatient hospital services, the additional expense due to changes in price was further decomposed into "pure price change"–changes in price for hospitals of the same type and location, and changes in the market share of hospitals with higher or lower average prices.

The decomposition allocates the additional spending for each service or admission in each year as follows. Let S represent the number of different services (or hospital admissions) in a market basket. In period 1, each service is performed N^1 times, and the average price for that service across all providers is p^1. Similarly, in period 2, each service is performed N^2 times, and the average price for that service across all providers is p^2.

Using this notation, the total change in cost is:

$$\sum_{i=1}^{S}(N_i^2 * P_i^2) - \sum_{i=1}^{S}(N_i^1 * P_i^1)$$

$$= \sum_{i=1}^{S}(N_i^2 * P_i^2) - \sum_{i=1}^{S}(N_i^2 * P_i^1) + \sum_{i=1}^{S}(N_i^2 * P_i^1) - \sum_{i=1}^{S}(N_i^1 * P_i^2) + \sum_{i=1}^{S}(N_i^1 * P_i^2) - \sum_{i=1}^{S}(N_i^1 * P_i^1)$$

$$= \sum_{i=1}^{S}(P_i^2 - P_i^1) * \frac{1}{2} * (N_i^{12} + N_i^2) + \sum_{i=1}^{S}(N_i^2 - N_i^1) * \frac{1}{2} * (P_i^1 + P_i^2)$$

$$= \sum_{i=1}^{S}(P_i^2 - P_i^1) * \frac{1}{2} * (N_i^1 + N_i^2)$$ (The amount attributable to change in price)

$$+ \sum_{i=1}^{S}\left(N_i^2 - N_i^1 * \frac{\sum_{i=1}^{S} N_i^2}{\sum_{i=1}^{S} N_i^1}\right) * \frac{1}{2} * (P_i^1 + P_i^2)$$ (The amount attributable to change in service mix)

$$+ \sum_{i=1}^{S}\left(N_i^1 * \frac{\sum_{i=1}^{S} N_i^2}{\sum_{i=1}^{S} N_i^1} - N_i^1\right) * \frac{1}{2} * (P_i^1 + P_i^2)$$ (The amount attributable to change in number of services)

Details of the calculations for each category of services are described below.

1. **Inpatient hospital services.** The unit of analysis was an inpatient stay for a specific DRG and severity of illness (SOI). The market basket for inpatient services included all hospitalizations associated with a DRG-SOI that occurred in at least five times in the years being compared (2007 and 2008 or 2008 and 2009). For each carrier, the number of admissions was calculated as the total number of inpatient stays for that DRG-SOI. Price was calculated as the average price for hospitals of the same type (tertiary and specialty or community) and location (Boston or outside Boston) for inpatient stays associated with that DRG-SOI.

2. **Outpatient hospital services.** The unit of analysis was a service, identified by a procedure code or revenue code[10] (when procedure code not available). The market basket included service codes corresponding to at least five claims in both comparison years. Services associated with codes that were discontinued or newly introduced between 2007 and 2009 were not included in the market basket.

3. **Outpatient facility claims and professional services.** Spending amounts for these claims were decomposed separately. A single service may be counted in the outpatient decomposition and again in the professional services decomposition if the outpatient facility and the physician billed separately. The number of services was calculated as the sum of the claims with the given service code.[11] The average price was calculated as the mean price paid by all carriers to all providers for a single unit of service associated with a service code.

4. **Professional services.** The unit of analysis was a service, identified by a procedure code.[12] As with outpatient hospital claims, the number of services was calculated as the sum of the number of claims with a given service code.

5. **Imaging services.** The unit of analysis and definition of average price and number of services are analogous to those used in the professional services decomposition. Inpatient facility charges for imaging services were not included, as these charges cannot be parsed from DRG payments for hospital stay.

[10] The procedure code modifier was used to separately track globally-billed services (no modifier) and services where only the technical component was billed (-TC modifier). Procedures with a -TC modifier were treated as wholly separate services in order to more accurately measure changes in price over time.

[11] For certain non-oral drugs and other services where price varied based on the number of units billed, the number of services was normalized using the average quantity of units billed per claim in 2007. This allowed for a more accurate measure of changes in price, while maintaining a measure of utilization that most closely followed the one claim one service standard for most services.

[12] As with outpatient hospital services, procedure codes with a modifier indicating the bill was for only the technical component (-TC) or professional component (-26) of the service were treated as a wholly separate service from procedures billed globally (no modifier). This ensures that changes in price reflect actual changes in the negotiated price for a service, rather than a shift from split billing to global billing.

B. Medicare

1. Data Sources

DHCFP provided calendar year Medicare files for 2007 and 2008. The Medicare files contain revenue center-level and claims-level information for beneficiaries enrolled in traditional fee-for-service Medicare (not for Medicare Advantage enrollees) in seven institutional and non-institutional data files: inpatient hospital care, outpatient services, hospice care, home health care, skilled nursing facility care, and carrier and durable medical equipment. DHCFP also provided Part D Event file with prescription drug claims. Table B.1 lists these data files and where they are used in the analyses. Finally, DHCFP provided data files with beneficiary enrollment and demographic information (the denominator file) as well data on the type and geographic region of the inpatient provider by National Provider Identifier (NPI).

Table B.1: Medicare Files Used for Analyses

File	Included in Analysis Category(ies)
Institutional Files	
Inpatient	Hospital and/or All Other Services
Outpatient	Outpatient[a] and/or All Other Services
Home Health	All Other Services
Hospice	All Other Services
SNF	All Other Services
Non-Institutional Files	
Carrier	Professional, Outpatient, and/or All Other Services
DME	Professional, Outpatient, and/or All Other Services
Part D Event File	Prescription Drugs

[a] All analyses of spending and service use are based on the revenue center files. Claim-level files were used to identify outpatient hospital provider, and categorize provider by region (metro Boston, northeast, southeast, central or west) and type (i.e., tertiary, specialty or community). This information was merged onto the revenue center files by unique beneficiary ID and claim ID.

2. Development of Analysis Files

The analysis files were compiled from tabulations of the various Medicare files as described below.

a. Medicare enrollment

To measure total spending for inpatient, outpatient, and professional services, Massachusetts residents enrolled in both or either Part A and Part B during all enrolled months were considered. To measure per member per year spending, analyses were limited to Massachusetts residents enrolled in both Part A and Part B. For Part D drug analyses, the number of months enrolled in part D among Medicare beneficiaries residing in Massachusetts and enrolled in FFS Medicare were counted.

b. Inpatient hospital care

DHCFP data were merged onto the 2008 inpatient file by NPI to categorize claims by type of hospital (tertiary, specialty or community) and the hospital's geographic region (metro Boston, southeast, northeast, central, west, or as out-of-state). Because NPI was missing on approximately 40 percent of the 2007 claims, it was necessary to create a cross-walk from NPI to Medicare provider ID using the 2008 IP file; type and region were then assigned to 2007 data using the Medicare Provider ID.

One hospital system, Southcoast, had one Medicare Provider ID linked to multiple NPIs, which in turn were associated with different hospital types (two NPIs were associated with community facilities and one NPI was associated with a tertiary facility). In the 2007 IP file, nearly all Southcoast claims included NPIs (16,466 of 16,507 claims). The remaining the 41 claims in 2007 were classified as related to community hospitals. In 2008, Southcoast's two community hospitals accounted for approximately 60 percent of the system's hospitalizations.

Claims for Christian Science hospitals, long-term hospitals, rehabilitation hospitals or units, children's hospitals,[13] and psychiatric hospitals were excluded from the inpatient analyses and included in the analyses of "all other services." Other claims for Massachusetts facilities that did not match to the list of facilities that DHCFP provided also were categorized as "all other services."

c. Hospital outpatient and freestanding facility services

Hospital-based outpatient facilities also were classified by type and geographic region using the data provided by DHCFP. The crosswalk from NPI to Medicare Provider ID created from the 2008 inpatient file was used to assign region and type to records in the 2007 and 2008 outpatient claims files. Consistent with inpatient analyses, outpatient claims for Christian Science hospitals, long-term hospitals, rehabilitation hospitals or units, pediatric hospitals, and psychiatric hospitals were flagged, omitted from outpatient analyses, and included in the analyses of "all other services." Also consistent with the inpatient analyses, 320 Southcoast outpatient claims in 2007 with missing NPI were assigned a community type of hospital code.[14] Information on type and geographic region was merged from claims files to the revenue-center level files by beneficiary ID and claim ID to measure spending and service use by outpatient facility type and region at the procedure code level.

Claims for freestanding facilities were obtained from the carrier and DME revenue center files. Specifically, any claims with provider specialty flagged as an independent diagnostic testing facility, ambulatory surgical center, or radiation therapy centers were categorized as freestanding facilities and included in analyses of outpatient services; all other non-person provider specialty codes were categorized as "all other services" (Table B.2).

[13] Because pediatric hospitals are not paid on the prospective payment system, they generally are missing DRG assignments and, therefore, are omitted from the analysis. These claims represented less than 0.1 percent of all inpatient claims.

[14] These 320 outpatient claims represented 0.2 percent of Southcoast outpatient claims in 2007.

Table B.2: Categorization of Freestanding Facilities and all Other Services Based on Provider Specialty Code

Provider specialty code	Description
Freestanding facilities	
47	Independent Diagnostic Testing Facility (IDTF)
49	Ambulatory surgical center (formerly miscellaneous)
74	Radiation Therapy Centers
All other services	
45	Mammography screening center
51	Medical supply company with certified orthotist (certified by American Board for Certification in Prosthetics and Orthotics)
52	Medical supply company with certified prosthetist (certified by American Board for Certification In Prosthetics and Orthotics)
53	Medical supply company with certified prosthetist-orthotist (certified by American Board for Certification in Prosthetics and Orthotics)
54	Medical supply company not included in 51, 52, or 53
58	Individuals not included in 55, 56, or 57
59	Ambulance service supplier, e.g., private ambulance companies, funeral homes, etc.
60	Public health or welfare agencies (federal, state, and local)
63	Portable X-ray supplier
69	Clinical laboratory (billing independently)
73	Mass Immunization Roster Biller
75	Slide Preparation Facilities
96	Competitive Acquisition Program (CAP) Vendor
A0	Hospital (DMERCs only)
A1	SNF (DMERCs only)
A2	Intermediate care nursing facility (DMERCs only)
A3	Nursing facility, other (DMERCs only)
A4	HHA (DMERCs only)
A5	Pharmacy (DMERCs only)
A6	Medical supply company with respiratory therapist (DMERCs only)
A7	Department store (for DMERC use, cross-walked from code 87)
B1	Supplier of oxygen and/or oxygen related equipment (effective 10/2/07)

d. Professional services

Carrier and DME claims were flagged as professional services, again using the provider specialty code, and then further classified as related to a primary care provider; including primary care physicians, doctors of osteopathy, nurse practitioners and physicians' assistants; or specialty provider (Table B.3). Using the place of service variable, professional claims were further categorized by location of service: inpatient, outpatient, office or clinic, other, or psychiatric facility (Table B.4).

Table B.3: Categorization of PCP and Specialty Professionals Based on Provider Specialty Code (continued on next page)

Provider specialty code	Description
PCP	
01	General practice
08	Family practice
11	Internal medicine
12	Osteopathic manipulative therapy
16	Obstetrics/gynecology
37	Pediatric medicine
38	Geriatric medicine
50	Nurse practitioner
84	Preventive medicine (eff 5/92)
97	Physician assistant
Specialist	
02	General surgery
03	Allergy/immunology
04	Otolaryngology
05	Anesthesiology
06	Cardiology
07	Dermatology
09	Interventional Pain Management (IPM)
10	Gastroenterology
13	Neurology
14	Neurosurgery
18	Ophthalmology
20	Orthopedic surgery
22	Pathology
24	Plastic and reconstructive surgery
25	Physical medicine and rehabilitation
26	Psychiatry
28	Colorectal surgery (formerly proctology)

Table B.3: Categorization of PCP and Specialty Professionals Based on Provider Specialty Code (continued on next page)

Provider specialty code	Description
Specialist (continued)	
29	Pulmonary disease
30	Diagnostic radiology
33	Thoracic surgery
34	Urology
36	Nuclear medicine
39	Nephrology
40	Hand surgery
44	Infectious disease
46	Endocrinology
66	Rheumatology
72	Pain Management
76	Peripheral vascular disease
77	Vascular surgery
78	Cardiac surgery
79	Addiction medicine
81	Critical care (intensivists)
82	Hematology (eff 5/92)
83	Hematology/oncology
85	Maxillofacial surgery
86	Neuropsychiatry
90	Medical oncology
91	Surgical oncology
92	Radiation oncology
93	Emergency medicine
94	Interventional radiology
98	Gynecologist/oncologist

Table B.3: Categorization of PCP and Specialty Professionals Based on Provider Specialty Code (continued from previous page)

Provider specialty code	Description
Other professionals	
19	Oral surgery (dentists only)
32	Anesthesiologist Assistants
35	Chiropractic
41	Optometry
42	Certified nurse midwife
43	CRNA
48	Podiatry
55	Individual certified orthotist
56	Individual certified prosthetist
57	Individual certified prosthetist-orthotist
62	Psychologist (billing independently)
64	Audiologist (billing independently)
65	Physical therapist
67	Occupational therapist
68	Clinical psychologist
71	Registered Dietician/Nutrition Professional
80	Licensed clinical social worker
89	Certified clinical nurse specialist
96	Optician
Unknown	
70	Multispecialty clinic or group practice
99	Unknown physician specialty

Table B.4: Location of Service Categorization for Professional Claims
(continued on next page)

CMS place of service code	CMS Place of Service Name
Inpatient	
21	Inpatient hospital
Outpatient	
22	Outpatient hospital
23	Emergency Room - hospital
20	Urgent care facility
24	Ambulatory surgical center
25	Birthing center
49	Independent clinic
62	Comprehensive outpatient rehabilitation facility
65	End-stage renal disease treatment facility
Office/clinic	
11	Office
50	Federally qualified health center
71	Public health clinic
72	Rural health clinic
Other	
31	Skilled nursing facility
61	Comprehensive inpatient rehabilitation facility
13	Assisted living facility
14	Group home
32	Nursing facility
33	Custodial care facility
54	Intermediate care facility/mentally retarded
01	Pharmacy
02	Unassigned
03	School
04	Homeless shelter
05	Indian Health Service
06	Indian Health Service
07	Tribal
08	Tribal
09-10	Unassigned
12	Home
15	Mobile unit
16-19	Unassigned
26	Military treatment facility

Table B.4: Location of Service Categorization for Professional Claims
(continued from previous page)

CMS place of service code	CMS Place of Service Name
Other (continued)	
27-30	Unassigned
34	Hospice
35-40	Unassigned
41	Ambulance - land
42	Ambulance - air
43-48	Unassigned
58-59	Unassigned
60	Mass immunization center
63-64	Unassigned
66-70	Unassigned
73-80	Unassigned
82-98	Unassigned
99	Other place of service
81	Independent laboratory
Psychiatric Facility	
51	Inpatient psychiatric facility
52	Psychiatric Facility - partial hospitalization
53	Community mental health center
55	Residential substance abuse treatment facility
56	Psychiatric residential treatment center
57	Nonresidential substance abuse treatment facility

3. Measures of Spending and Service Use

Variables from the denominator file were merged onto the claims files by the unique beneficiary ID to flag claims associated with Massachusetts residents enrolled in either or both Medicare Parts A and B. Total and per member per year spending and service use were calculated using only these records.

Total spending includes both Medicare payments and beneficiary cost-sharing but exclude payments by third-party payers as these payments may be included in private payer data. Table B.5 describes the variables and calculation used to calculate total spending and beneficiary cost-sharing.

Table B.5: Variables Used to Calculate Medicare Spending

File Type	Total Medicare Payments = Medicare Payments + Patient Cost-Sharing	Patient Cost-Sharing
Inpatient	(PMT_AMT+(PERDIEM*UTIL_DAY)) + DED_AMT + COIN_AMT + BLDDEDAM	DED_AMT + COIN_AMT + BLDDEDAM
Outpatient	REVPMT + PTNTRESP	PTNTRESP
Carrier	LINEPMT + LDEDAMT + COINAMT	LDEDAMT + COINAMT
DME	LINEPMT + LDEDAMT + COINAMT	LDEDAMT + COINAMT
SNF	PMT_AMT+ DED_AMT + COIN_AMT + BLDDEDAM	DED_AMT + COIN_AMT + BLDDEDAM
HHA	PMT_AMT	N/A
HSP	PMT_AMT	N/A
PDE	CPP_AMT + NPP_AMT + OTHTROOP + PTPAYAMT	PTPAYAMT

Source: Research Data Assistance Center (ResDAC) payment calculation worksheets.

Service use was measured as the number of admissions and number of Medicare-covered days. For most hospitalizations, one claim represented one admission. However, for long-stay hospitalizations which can generate more than one claim, only one of the claims associated with an admission for the same patient at the same facility on the same admission date was counted to produce an estimate of service use. Transfers and re-admissions were treated as separate admissions. For professional and outpatient services, service use was measured as the number of procedures or line items. For prescription drug analyses, service use was measured as the number of claims, with each claim representing a prescription fill.

C. MassHealth

1. Data Sources

DHCFP provided quarterly Medicaid MSIS files for the second quarter of fiscal year 2007 (January-March 2007) through the first quarter of fiscal year 2010 (October-December 2009). Because corrected third quarter fiscal year 2009 MSIS files (to address quality problems in the current data) were not yet available, only claims incurred in calendar years 2007 and 2008 were analyzed.

Each quarterly MSIS file included eligibility files as well as inpatient, long-term care, other service, and prescription drug claims files. DHCFP also provided a spreadsheet of MassHealth monthly capitation payments for enrollees in comprehensive managed care organization (MCOs) plans and enrollees in the Massachusetts Behavioral Health Partnership (MBHP) program.

2. Development of Analysis Files

a. Medicaid eligibility

Calendar year eligibility files for 2007 and 2008 were prepared based on a review of five quarters of data for each year, using the most recent eligibility record available within the five quarters.[15] Business Rules current as of February 2, 2011 were used to recode the 2007 and 2008 calendar year files, as indicated in Table C.1.[16]

For each month of eligibility, multiple flags were created to indicate whether the beneficiary was:

- Enrolled in a managed care organization (MCO) or Medicaid's Program of All-Inclusive Care for the Elderly (PACE), or the FFS program.
- Enrolled in a capitated carve out plan for behavioral health services.
- Enrolled in a primary care case management (PCCM) program.
- Eligible for full or restricted benefits in each month.
- Dually eligible for Medicare (not a Medicare beneficiary, QMB only, QMB and Medicaid, SLMB only, SLMB and Medicaid, or other Medicare status).

[15] Only five quarters of enrollment data were available for 2008 due to known data quality problems in the 2009 MSIS data files. Examination of the distribution of beneficiaries' characteristics and enrollment status based on five versus the nine quarters of data available for 2007 revealed no material differences.

[16] The Business Rules identify issues in the eligibility data that require re-coding; they are updated annually. Based on the February 2, 2011 business rules, enrollees in Commonwealth Care were categorized as enrolled in comprehensive managed care organizations. A later business rule, not applied in this analysis, categorized this population as FFS enrollees with restricted benefits.

- Eligible in one of the following categories: aged, blind/disabled, child, adult, or foster care child.
- Enrolled in CHIP.
- Enrolled in private health insurance (private coverage purchased by state, or private coverage purchased by third-party payer) or no private coverage.
- Eligible for a maintenance-assistance program, receiving cash or eligible under section 1931, medically-needy, poverty-related, other, or eligible under the section 1115-demonstration expansion.
- Receiving temporary assistance for needy families (TANF).

Table C.1: 2008 Business Rules for Medicaid Eligibility Recoding

Recode item	Description
1	All persons with dual codes 01, 03 and 06 should be assigned restricted benefits code 3.
2	Persons in state specific eligibility codes 2401CA, 2409CA and 2501CA should be reported to dual code 03 and assigned restricted benefits code 3.
3	For each month, persons with 'AX' in the bytes 1-2 of the state specific eligibility code should have "AZ" in bytes 1-2 and recoded to CHIP code 3.
4	All person age 65 or greater in BOE 2 should be reassigned to BOE 1.
5	All persons assigned CHIP=3 for a month should have MASBOE and all other monthly data elements 0-filled for that month, except the state specific eligibility code and the CHIP code.
6	Persons with dual code 02, 04, or 08 should have restricted benefits code 1.
7	Each month, all persons with CP, CR, CT, CV, or CX in bytes 1-2 of the state specific eligibility code should be moved to UEG 00 for that month and all other monthly fields 0-filled, except for the state-specific eligibility code. Among that group, if UEG = 00 in all 12 months and CHIP not = 3 in all 12 months, delete them from the BPSF file.
8	Each month, persons with 37, 38, 41, 51, 59, 60, 61, 70, 72, 77, 78, 79, 82, 84, 86, 95, 97, AB, AM, AN, AR, and ED in the first 2 bytes of the state specific eligibility code should have RBF 5.
9	Each month, move all persons in invalid UEG codes (91, 92, 95) to UEG 00. These enrollees should have MAS/BOE and all other monthly data elements 0-filled for the month, except the state specific eligibility code and the CHIP code.
10	For each month, persons in state group '80' should be assigned to RBF 4.
11	For the development of MAX 2008, in the application of correction or retroactive records, exclude the corr/retro records when the state-specific code assigned in the original (current) record is CN, CQ, CS, CU, or CW in bytes 1-2.
12	For each month, enrollees in Waiver ID 'N' should be remapped to MASBOE 54 if under age 21; to MASBOE 55 if age 21-64; and to MASBOE 51 if age 65 or older. [Implement after rule #11]

The distribution of MassHealth enrollee member months across major eligibility and enrollment categories is reported in Table C.2.

Table C.2: MassHealth Member Months by Selected Eligibility and Enrollment Characteristics, 2007-2008

	CY2007		CY2008	
	Number of member months	Percent of total member months	Number of member months	Percent of total member months
Total member months	14,564,283	100.0%	15,565,657	100.0%
Benefits status				
Restricted benefits	1,702,738	11.7%	1,786,199	11.5%
Full benefits	12,861,545	88.3%	13,779,458	88.5%
Plan enrollment[a]				
Comprehensive managed care[b]	5,478,338	37.6%	6,619,099	42.5%
Fee-for-service	9,085,945	62.4%	8,946,558	57.5%
Dual eligible status[c]				
Not a Medicare beneficiary	11,893,656	81.7%	12,846,735	82.5%
Medicare - QMB only	7,597	0.1%	6,090	0.0%
Medicare - QMB and Medicaid	2,195,907	15.1%	2,265,626	14.6%
Medicare - SLMB only	105,484	0.7%	69,356	0.4%
Medicare - SLMB and Medicaid	45,933	0.3%	57,364	0.4%
Medicare - other	315,706	2.2%	320,486	2.1%
Basis of eligibility				
Aged	1,661,742	11.4%	1,694,468	10.9%
Blind/disabled	2,762,440	19.0%	2,816,837	18.1%
Child	4,992,252	34.3%	5,194,684	33.4%
Adult	5,142,278	35.3%	5,853,757	37.6%
Foster care child	5,571	0.0%	5,911	0.0%
CHIP enrollment[d]				
Medicaid eligible, not in CHIP	13,814,825	94.9%	14,812,029	95.2%
CHIP	749,458	5.1%	753,628	4.8%

Source: Mathematica Policy Research analysis of MassHealth of 2007 and 2008 MSIS eligibility files.

[a] Managed care months included beneficiary months with at least one of the four monthly plan type variables set equal to comprehensive managed care organization or PACE. FFS months included beneficiary months where none of the four plan type variables were equal to comprehensive managed care or PACE. Both managed care months and FFS months may include behavioral health and/or PCCM enrollment.

[b] Based on business rules current as of February 28, 2011, CommCare enrollees are categorized as enrolled in comprehensive managed care organizations. Later business rules classify Commonwealth Care enrollees as FFS with restricted benefits.

[c] Categories of Dual Eligible Beneficiaries (described in the 2009 Medicaid Statistical Information System (MSIS) File Specifications and Data Dictionary) are defined as: (1) QMB Only (Qualified Medicare Beneficiaries without other Medicaid): individuals entitled to Medicare Part A, with income of 100% Federal poverty level (FPL) or less and resources that do not exceed twice the limit for SSI eligibility, and not otherwise eligible for full Medicaid. Medicaid pays their Medicare Part A premiums, if any, Medicare Part B premiums, and Medicare deductibles and coinsurance for Medicare services provided by Medicare providers. (2) QMB and Medicaid (Qualified Medicare Beneficiaries with Medicaid Coverage): individuals entitled to Medicare Part A, with income of 100% FPL or less and resources that do not exceed twice the limit for SSI eligibility. Effective 2006, these individuals qualify for one or more Medicaid benefits that do not include prescription drugs. Medicaid pays their Medicare Part A premiums, if any, Medicare Part B premiums, and Medicare deductibles and coinsurance, and provides one or more Medicaid benefits. Part D provides drug coverage for these individuals, but Medicaid drug benefits are not required for an individual to be reported in this group. (3) SLMB Only (Specified Low-Income Medicare Beneficiaries without other Medicaid): individuals entitled to Medicare Part A, with income of 100 -120% FPL and resources that do not exceed twice the limit for SSI eligibility, and not otherwise eligible for Medicaid. Medicaid pays their Medicare Part B premiums only. (4) SLMB and Medicaid (Specified Low-Income Medicare Beneficiaries with Medicaid Coverage): individuals entitled to Medicare Part A, with income of 100-120% FPL and resources that do not exceed twice the limit for SSI eligibility. These individuals qualify for one or more Medicaid benefits excluding prescription drug coverage benefits. Medicaid pays their Medicare Part B premiums and provides one or more Medicaid benefits. (5) Other (Other Dual Eligibles): individuals in programs such as Pharmacy + Waivers, in states that do not include prescription drugs in Medicaid benefits for some groups, and special dual eligible groups approved under special circumstances. This code is to be used only with specific CMS approval.

[d] CHIP: Children's Health Insurance Program.

b. Medical claims

Incurred-date calendar year 2007 and 2008 claims files were created for inpatient, long-term care, other services calendar years using the beginning-date-of-service variable. Incurred date 2007 and 2008 prescription drug files were created using the prescription fill date variable. Because the DRG field on the MSIS files was believed to be incorrect, DHCFP used an APR-DRG grouper to assign an APR-DRG to each claim, in order to identify it as medical, surgical, behavioral health, or maternity and newborn care.

Each record in each incurred date claims file was linked to the eligibility data by a unique patient identifier, further matching month of service to month of enrollment. Claims for which the month of service and month of enrollment did not match (less than 1 percent) were excluded from the analysis (Table C.3).

Table C.3: Percent of Medicaid Claims That Matched to Enrollee Data by Enrollment Category and Claims Data File 2007-2008

	Inpatient care		Long-term care		Other services		Prescription drugs	
	2007	2008	2007	2008	2007	2008	2007	2008
Total FFS or MCO/PACE	99.67	99.29	99.95	99.77	99.69	99.41	99.78	99.83
FFS unrestricted benefits	92.45	93.63	99.83	99.66	84.82	84.26	86.34	84.88
FFS restricted benefits	5.61	4.43	0.03	0.02	5.75	5.82	12.25	13.89
MCO/PACE	1.61	1.23	0.09	0.09	9.12	9.33	1.19	1.06
Not enrolled	0.20	0.16	0.01	0.01	0.18	0.18	0.14	0.13
Not in eligibility file	0.13	0.56	0.03	0.22	0.12	0.41	0.09	0.03

Source: Mathematica Policy Research analysis of MassHealth of 2007 and 2008 MSIS eligibility and claims files.

Approximately 9 percent of claims from the other-services file matched to a member month enrolled in managed care. Typically, these claims were dental or transportation/other services for MCO enrollees, but might also include services provided to Commonwealth Care enrollees. All claims that matched to a managed care month were included in analyses of managed care payments.

FFS claims for beneficiaries with restricted and full benefits were analyzed separately. Claims were categorized into five service types: (1) acute inpatient care; (2) outpatient care, including outpatient hospital and freestanding facilities; (3) physician and other professional services; (4) prescription drugs; and (5) all other services. The type of service variable was used to assign claims in the other services file to appropriate service categories. These assignments are summarized in Table C.4.

Table C.4: Assignment of Claims from the Other-Services Claims Files to Service Categories

Service category/Type of service code	Description
Outpatient hospital and freestanding facilities	
11	Outpatient hospital
12	Clinic
Physician and other professional services	
8	Physicians
9	Dental
10	Other practitioners
24	Sterilizations
31	Targeted case management
34	PT, OT, speech, hearing, language
36	Nurse midwife services
37	Nurse practitioner services
All other services	
1	Inpatient hospital[a]
2	Mental hospital services for the aged
4	Inpatient psychiatric facility services for individuals through age 21
5	Services for the mentally retarded
7	NF'S - all other
13	Home health
15	Lab and X-ray
16	Prescribed drugs
19	Other services
26	Transportation services
30	Personal care services
33	Rehabilitation services
35	Hospice benefits
41	Unknown
99+	Invalid or unknown codes-included in error tolerance
Dropped from the service-type analyses	
20	Capitated payments to HMO, HIO, or PACE plan[b]
21	Capitated payments to prepaid health plans (PHPs)[b]

[a] Primary diagnosis codes on claims flagged as inpatient hospital in the OT file suggested these were services such as psychotherapy visits, injections and dialysis that may or may not have been associated with an inpatient stay.

[b] All capitated payments were dropped from the calendar year other-services files. Data on monthly payments for enrollees in MCOs and MBHP were provided by DHCFP.

Other selected data issues for various service categories were resolved as follows:

- *Acute inpatient.* DHCFP provided a list of acute care hospitals by type (tertiary, specialty, or community), which was merged with the inpatient file. Acute inpatient claims that did not match to an acute care hospital on that list were categorized as claims for out-of-state facilities.
- *Physician services.* Because there are no quality standards for the specialty code field on the other services file and this field did not appear to be reliably coded, there was no attempt to assign physicians to primary care or specialty categories.
- *Long-term care.* All claims in the long-term care data file were categorized as "all other," in order to be as consistent as possible with coding for the analysis of private insurance cost trends.
- *Prescription drugs.* All claims in the prescription drug file were included in the prescription drug analyses.

3. Measures of Spending and Service Use

Medicaid spending was measured as Medicaid payments for all claims that matched to an enrolled and eligible member month. Medicaid payments were calculated as the sum of the Medicaid amount paid, the Medicare coinsurance payment (if any), and the Medicare deductible payment (if any).[17] Claims categorized as original claims were dropped (191 claims from the 2007 inpatient file and 1,553 claims from the 2008 inpatient file) if they had a negative payment amount but no corresponding adjustment claim with a positive payment amount.

Only claims flagged as "original claim/encounter" were included in measures of service use in order to avoid double-counting claims associated with re-submittals, voids and adjustments. For inpatient service use was measured as the number of admissions; claims for the same person with the same admission date at the same facility were rolled up into single admission. Use of outpatient services, professional services, and prescription drugs was measured as the number of original claims.

[17] Medicare coinsurance payments and Medicare deductible payments, when those fields were coded with 8's or 9's (indicating there was no Medicaid payment), were recoded to zero.

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